FIG. 1

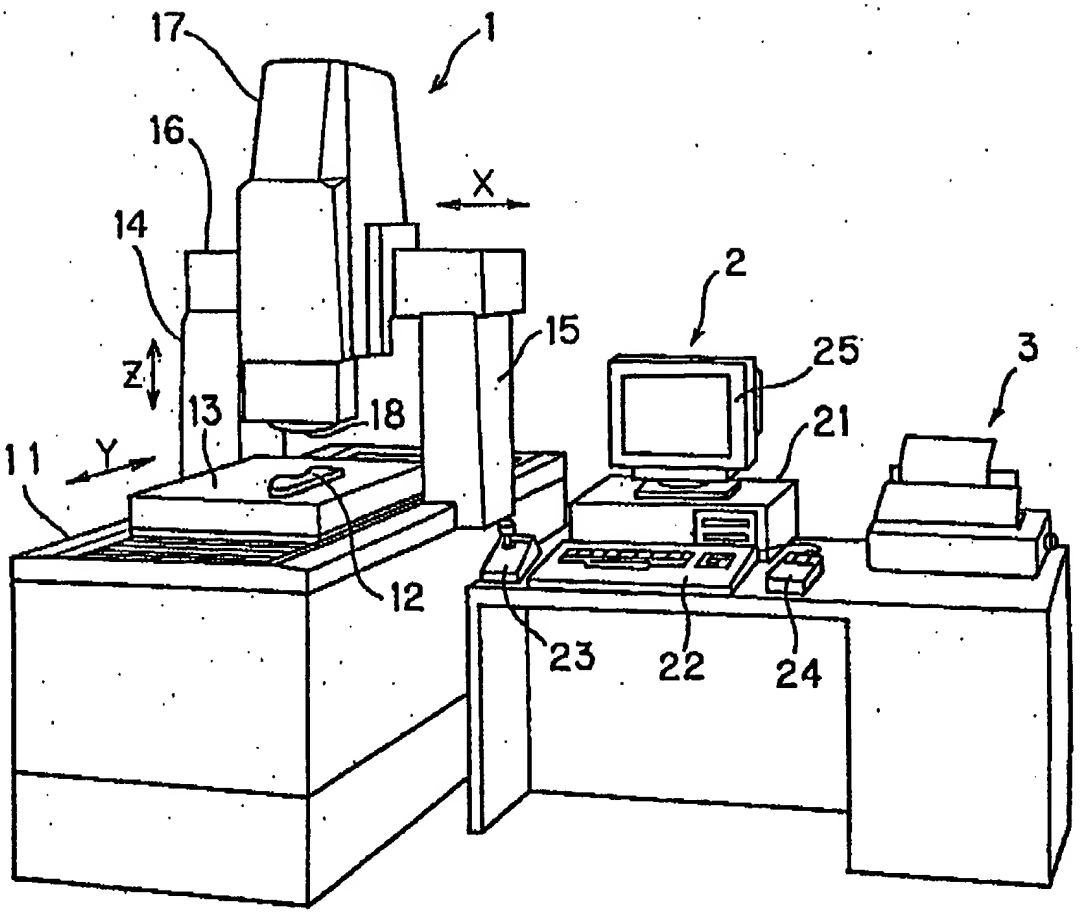


FIG. 2

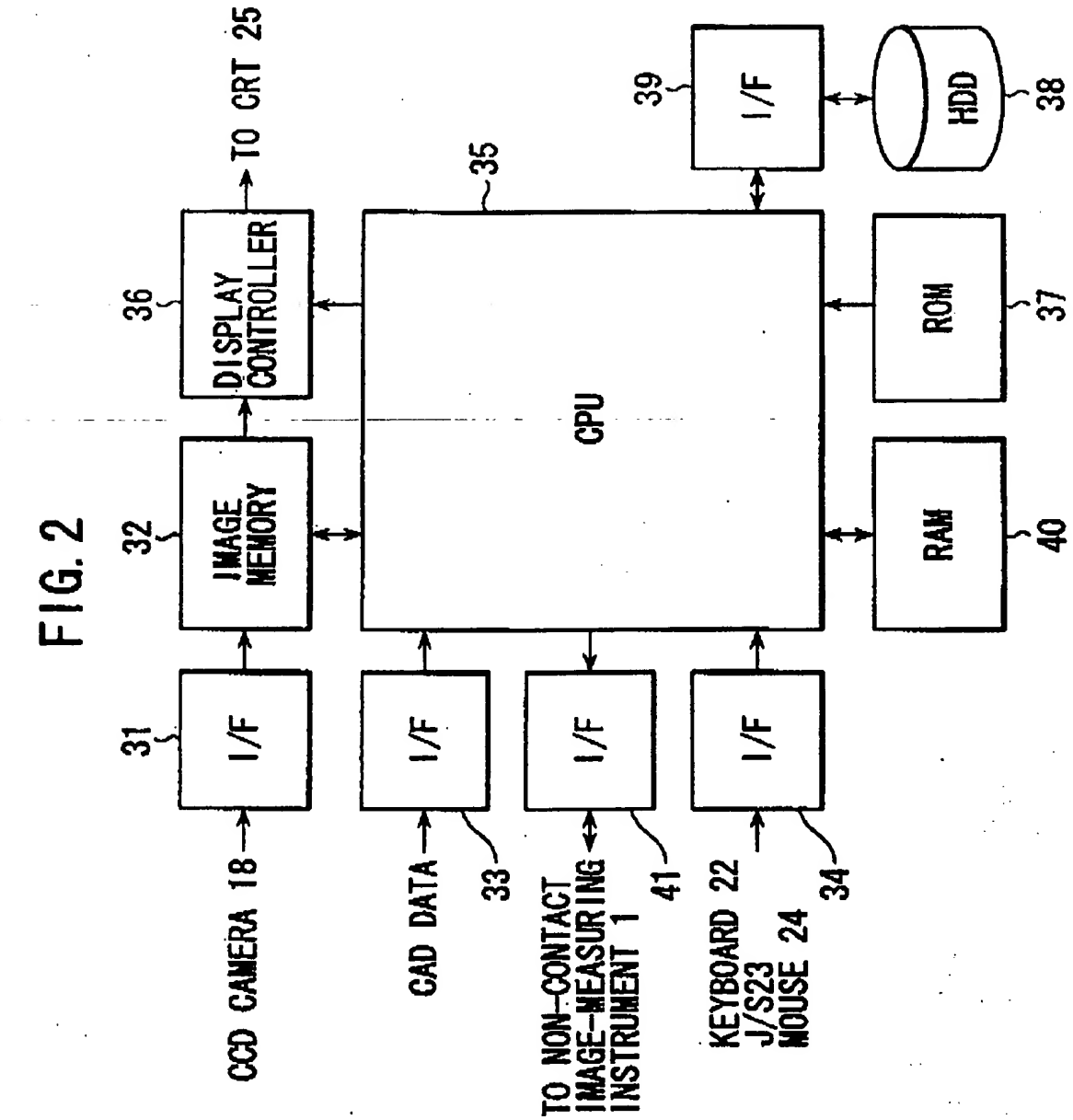

CCD CAMERA 18
31
I/F
IMAGE MEMORY
32
DISPLAY CONTROLLER
36
TO CRT 25
CAD DATA
33
I/F
TO NON-CONTACT IMAGE-MEASURING INSTRUMENT 1
41
I/F
KEYBOARD 22
J/S23
MOUSE 24
34
I/F
CPU
35
I/F
39
HDD
38
ROM
37
RAM
40

FIG. 3

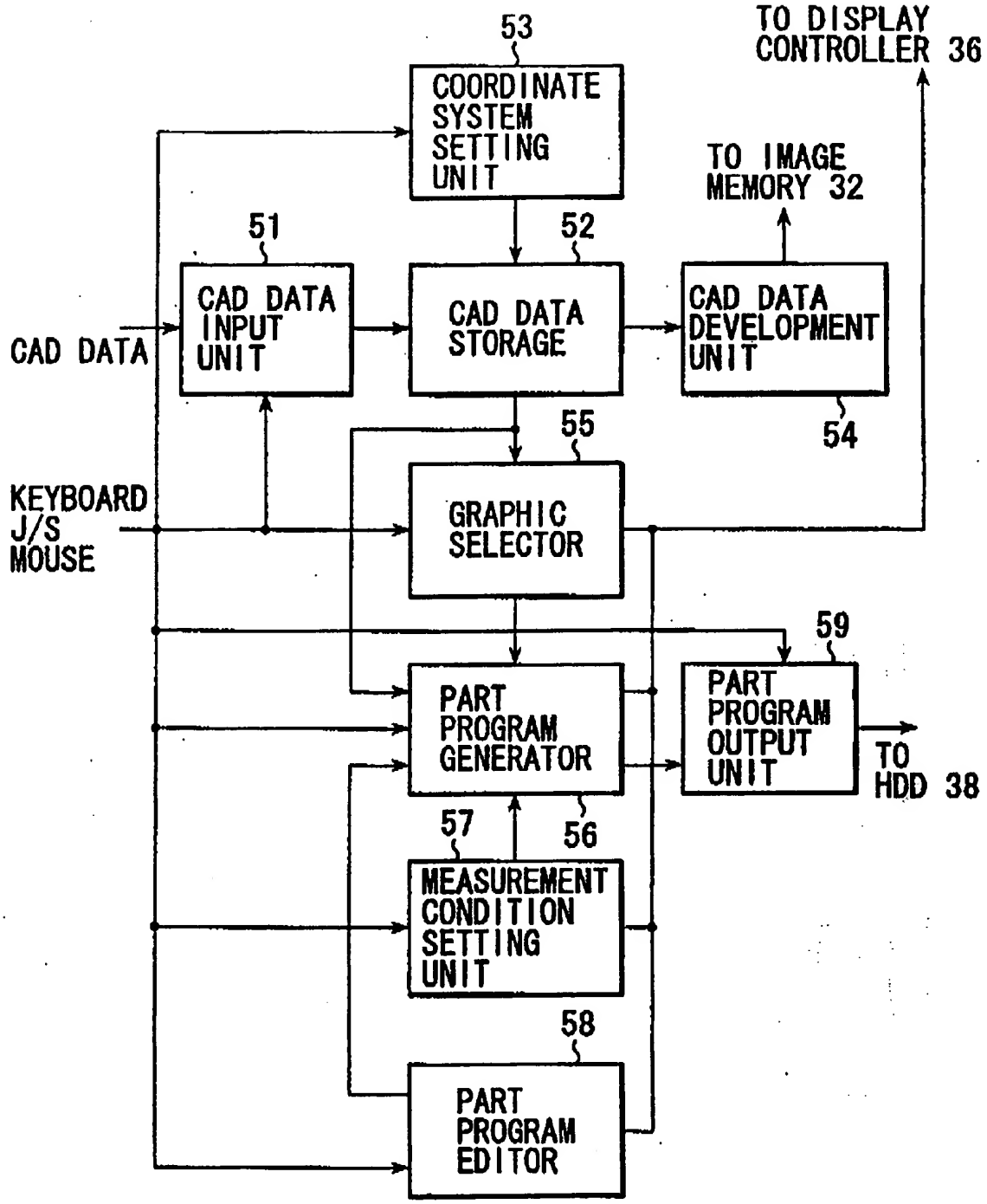

53
COORDINATE SYSTEM SETTING UNIT
TO DISPLAY CONTROLLER 36
TO IMAGE MEMORY 32
51
52
CAD DATA INPUT UNIT
CAD DATA STORAGE
CAD DATA DEVELOPMENT UNIT
CAD DATA
54
55
KEYBOARD J/S MOUSE
GRAPHIC SELECTOR
59
PART PROGRAM GENERATOR
PART PROGRAM OUTPUT UNIT
TO HDD 38
57
56
MEASUREMENT CONDITION SETTING UNIT
58
PART PROGRAM EDITOR

FIG. 4

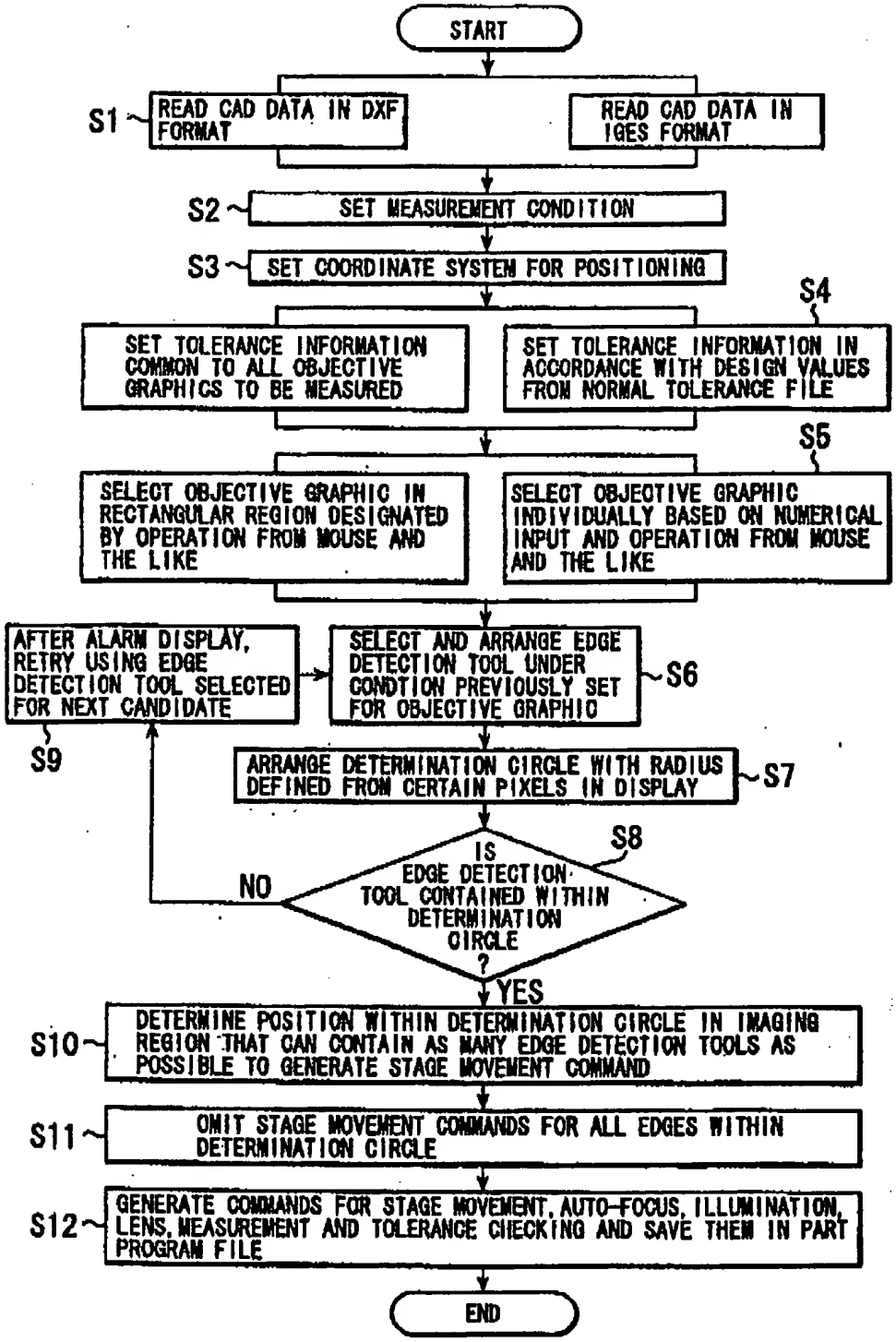

START
S1
READ CAD DATA IN DXF FORMAT
READ CAD DATA IN IGES FORMAT
S2
SET MEASUREMENT CONDITION
S3
SET COORDINATE SYSTEM FOR POSITIONING
S4
SET TOLERANCE INFORMATION COMMON TO ALL OBJECTIVE GRAPHICS TO BE MEASURED
SET TOLERANCE INFORMATION IN ACCORDANCE WITH DESIGN VALUES FROM NORMAL TOLERANCE FILE
S5
SELECT OBJECTIVE GRAPHIC IN RECTANGULAR REGION DESIGNATED BY OPERATION FROM MOUSE AND THE LIKE
SELECT OBJECTIVE GRAPHIC INDIVIDUALLY BASED ON NUMERICAL INPUT AND OPERATION FROM MOUSE AND THE LIKE
AFTER ALARM DISPLAY, RETRY USING EDGE DETECTION TOOL SELECTED FOR NEXT CANDIDATE
S9
SELECT AND ARRANGE EDGE DETECTION TOOL UNDER CONDTION PREVIOUSLY SET FOR OBJECTIVE GRAPHIC
S6
ARRANGE DETERMINATION CIRCLE WITH RADIUS DEFINED FROM CERTAIN PIXELS IN DISPLAY
S7
S8
IS EDGE DETECTION TOOL CONTAINED WITHIN DETERMINATION CIRCLE ?
NO
YES
S10
DETERMINE POSITION WITHIN DETERMINATION CIRCLE IN IMAGING REGION THAT CAN CONTAIN AS MANY EDGE DETECTION TOOLS AS POSSIBLE TO GENERATE STAGE MOVEMENT COMMAND
S11
OMIT STAGE MOVEMENT COMMANDS FOR ALL EDGES WITHIN DETERMINATION CIRCLE
S12
GENERATE COMMANDS FOR STAGE MOVEMENT, AUTO-FOCUS, ILLUMINATION, LENS, MEASUREMENT AND TOLERANCE CHECKING AND SAVE THEM IN PART PROGRAM FILE
END

FIG. 5

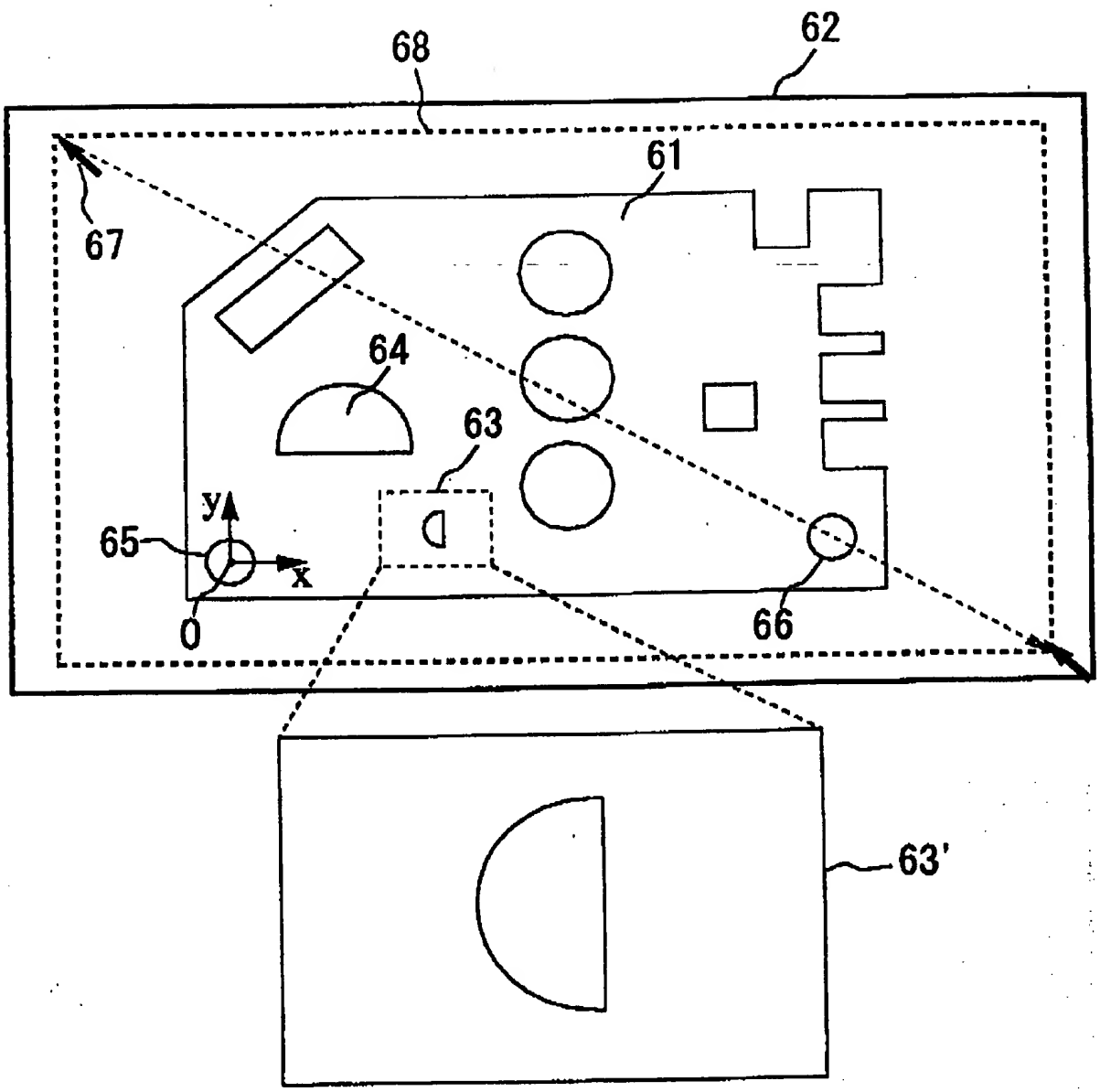


FIG. 6

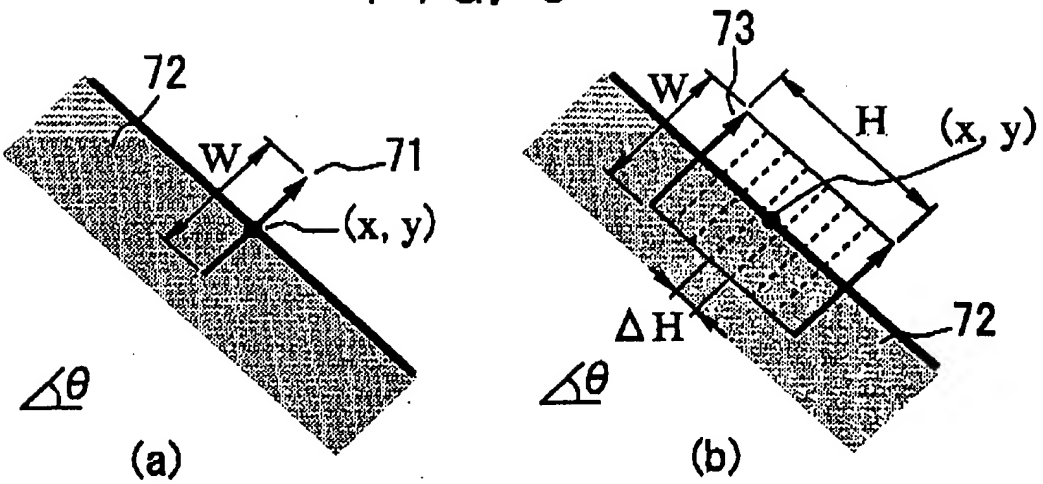
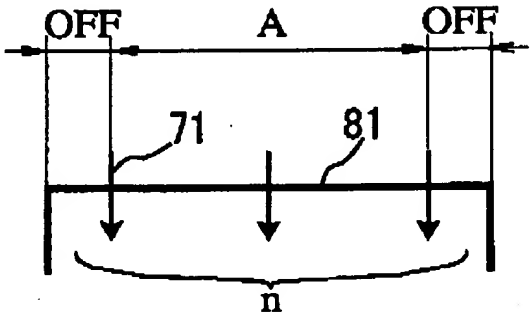


FIG. 7



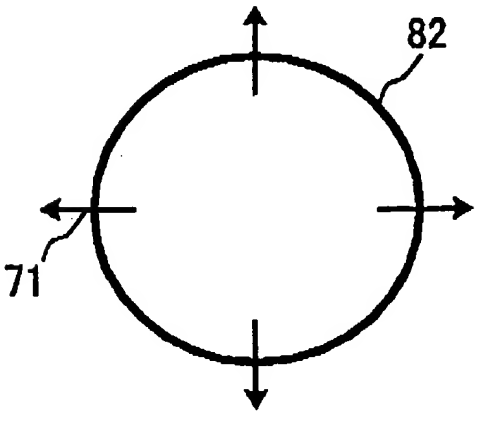


FIG. 8

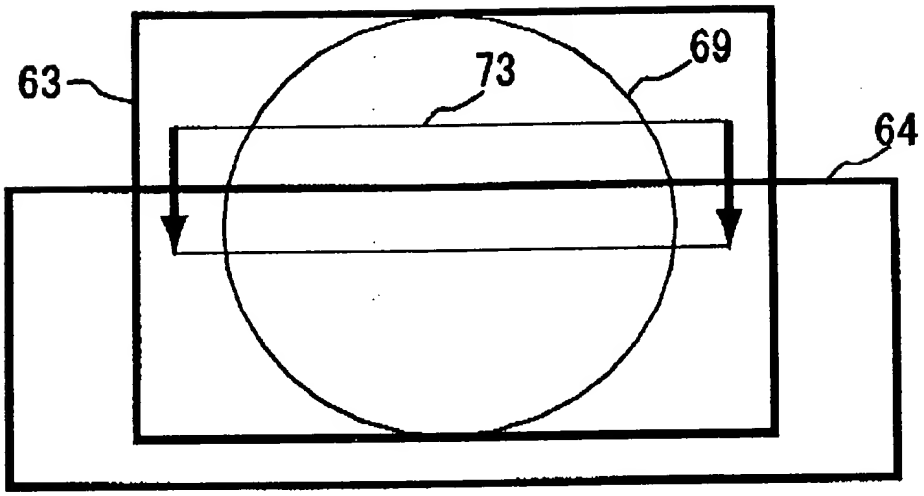
PRIMARY CANDIDATE

GRAPHIC ELEMENT	TOOL TYPE	NUMBER OF TOOLS	LENGTH:W(pixel)	OFFSET:OFF(%)
LINE	2	3	20	10
CIRCLE	1	4	20	-
CIRCULAR ARC	1	3	20	10

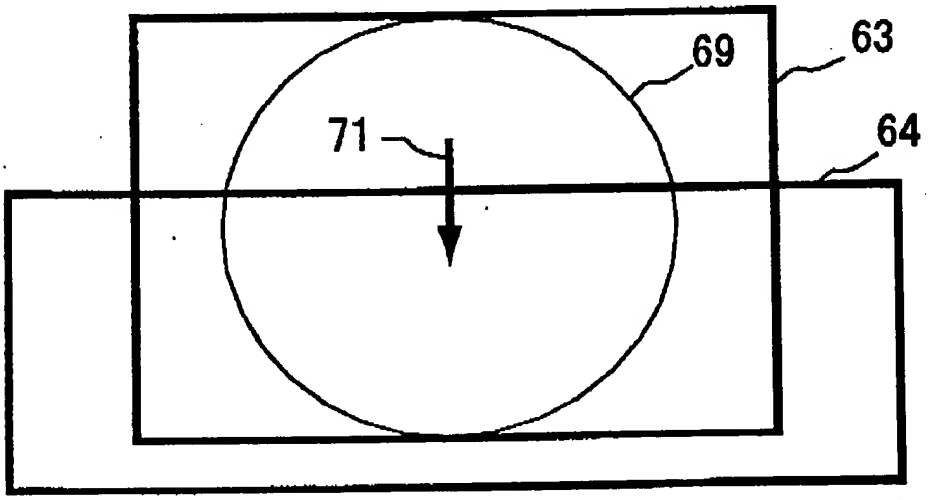
SECONDARY CANDIDATE

GRAPHIC ELEMENT	TOOL TYPE	NUMBER OF TOOLS	LENGTH:W(pixel)	OFFSET:OFF(%)
LINE	1	3	15	10
CIRCLE	2	4	15	-
CIRCULAR ARC	2	3	15	10

FIG. 9



(a)



(b)

FIG. 10

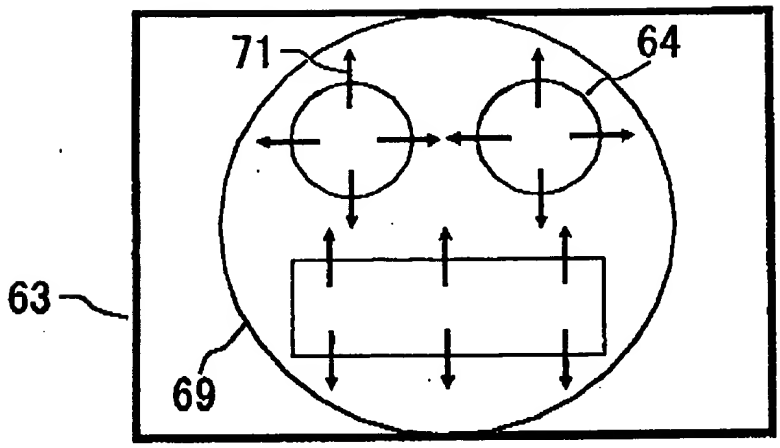


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FIG. 11

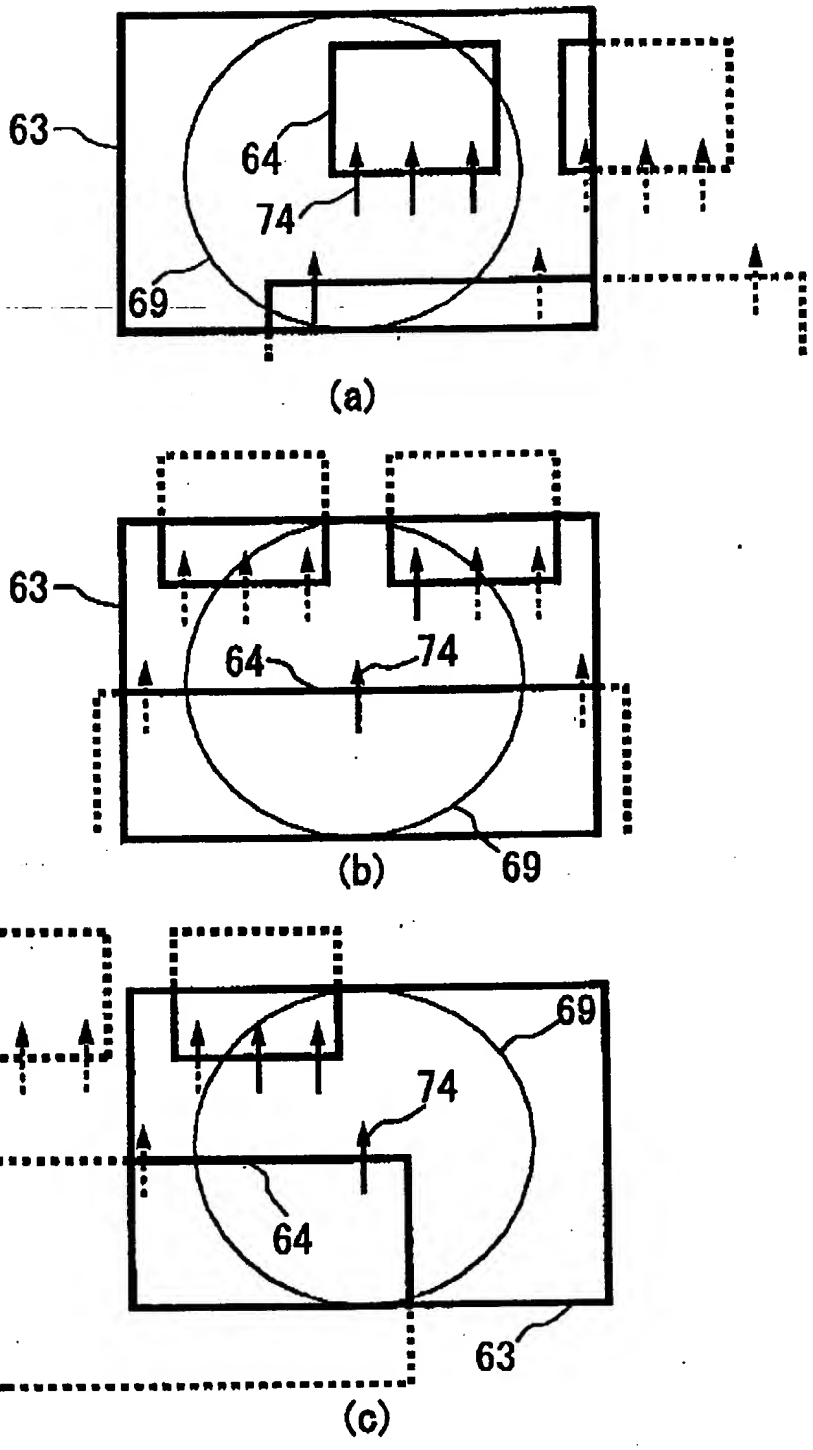


FIG. 12

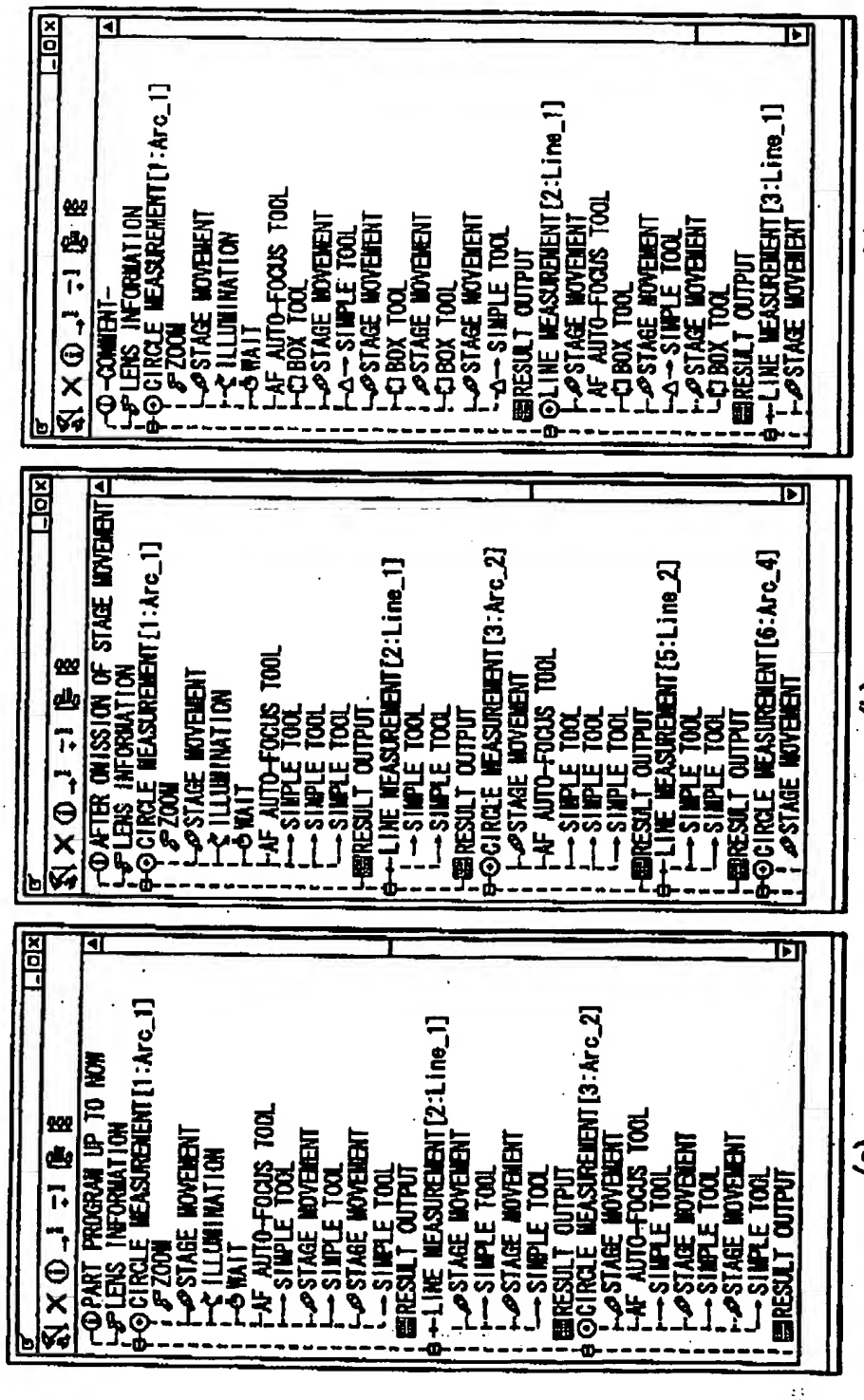

(a)
PART PROGRAM UP TO NOW
LENS INFORMATION
CIRCLE MEASUREMENT[1:Arc_1]
ZOOM
STAGE MOVEMENT
ILLUMINATION
WAIT
AF AUTO-FOCUS TOOL
SIMPLE TOOL
STAGE MOVEMENT
SIMPLE TOOL
STAGE MOVEMENT
SIMPLE TOOL
RESULT OUTPUT
LINE MEASUREMENT[2:Line_1]
STAGE MOVEMENT
SIMPLE TOOL
STAGE MOVEMENT
SIMPLE TOOL
RESULT OUTPUT
CIRCLE MEASUREMENT[3:Arc_2]
STAGE MOVEMENT
AF AUTO-FOCUS TOOL
SIMPLE TOOL
SIMPLE TOOL
RESULT OUTPUT
LINE MEASUREMENT[5:Line_2]
STAGE MOVEMENT
SIMPLE TOOL
SIMPLE TOOL
RESULT OUTPUT
CIRCLE MEASUREMENT[6:Arc_4]
STAGE MOVEMENT
(b)
AFTER OMISSION OF STAGE MOVEMENT
LENS INFORMATION
CIRCLE MEASUREMENT[1:Arc_1]
ZOOM
STAGE MOVEMENT
ILLUMINATION
WAIT
AF AUTO-FOCUS TOOL
SIMPLE TOOL
SIMPLE TOOL
SIMPLE TOOL
RESULT OUTPUT
LINE MEASUREMENT[2:Line_1]
SIMPLE TOOL
SIMPLE TOOL
RESULT OUTPUT
CIRCLE MEASUREMENT[3:Arc_2]
STAGE MOVEMENT
AF AUTO-FOCUS TOOL
SIMPLE TOOL
SIMPLE TOOL
RESULT OUTPUT
LINE MEASUREMENT[5:Line_2]
SIMPLE TOOL
SIMPLE TOOL
RESULT OUTPUT
CIRCLE MEASUREMENT[6:Arc_4]
STAGE MOVEMENT
(c)
COMMENT
LENS INFORMATION
CIRCLE MEASUREMENT[1:Arc_1]
ZOOM
STAGE MOVEMENT
ILLUMINATION
WAIT
AF AUTO-FOCUS TOOL
BOX TOOL
STAGE MOVEMENT
SIMPLE TOOL
STAGE MOVEMENT
BOX TOOL
STAGE MOVEMENT
BOX TOOL
STAGE MOVEMENT
SIMPLE TOOL
RESULT OUTPUT
LINE MEASUREMENT[2:Line_1]
STAGE MOVEMENT
AF AUTO-FOCUS TOOL
BOX TOOL
STAGE MOVEMENT
SIMPLE TOOL
STAGE MOVEMENT
BOX TOOL
RESULT OUTPUT
LINE MEASUREMENT[3:Line_1]
STAGE MOVEMENT

FIG. 13

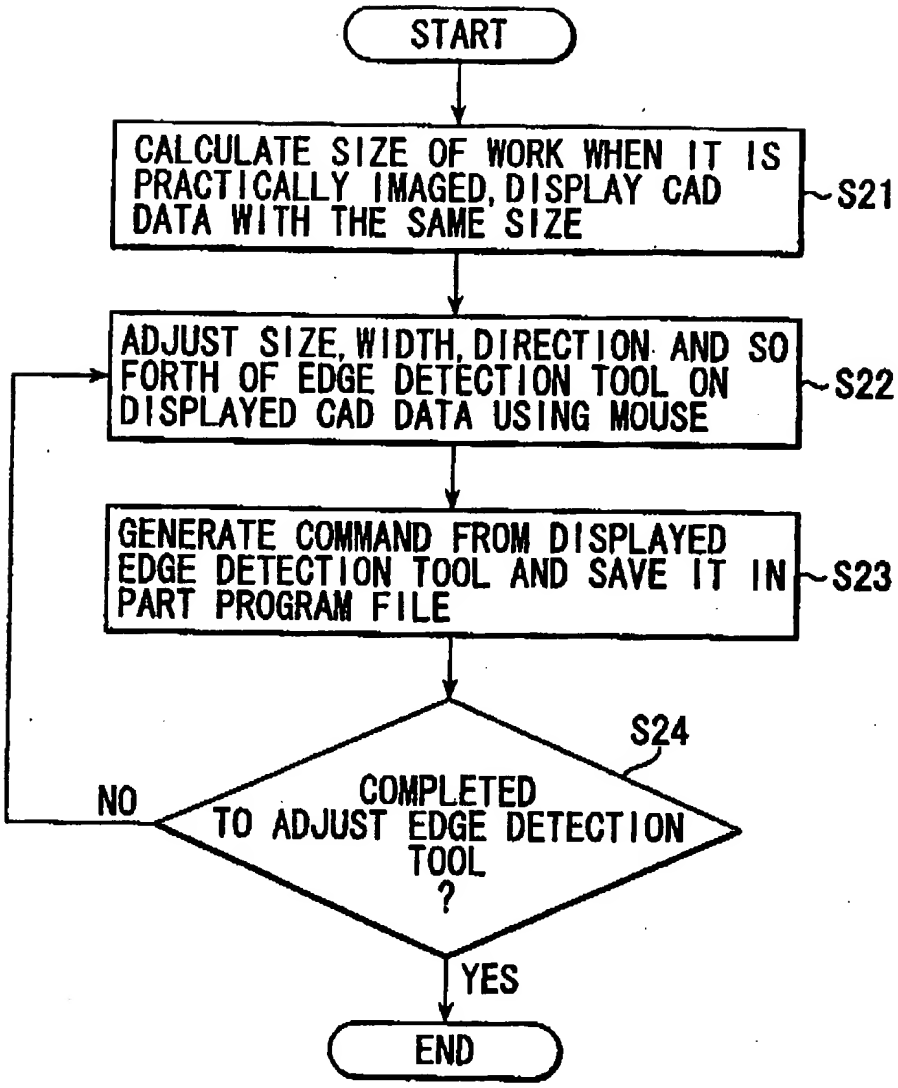

START
CALCULATE SIZE OF WORK WHEN IT IS PRACTICALLY IMAGED, DISPLAY CAD DATA WITH THE SAME SIZE
S21
ADJUST SIZE, WIDTH, DIRECTION AND SO FORTH OF EDGE DETECTION TOOL ON DISPLAYED CAD DATA USING MOUSE
S22
GENERATE COMMAND FROM DISPLAYED EDGE DETECTION TOOL AND SAVE IT IN PART PROGRAM FILE
S23
S24
COMPLETED TO ADJUST EDGE DETECTION TOOL ?
NO
YES
END

FIG. 14

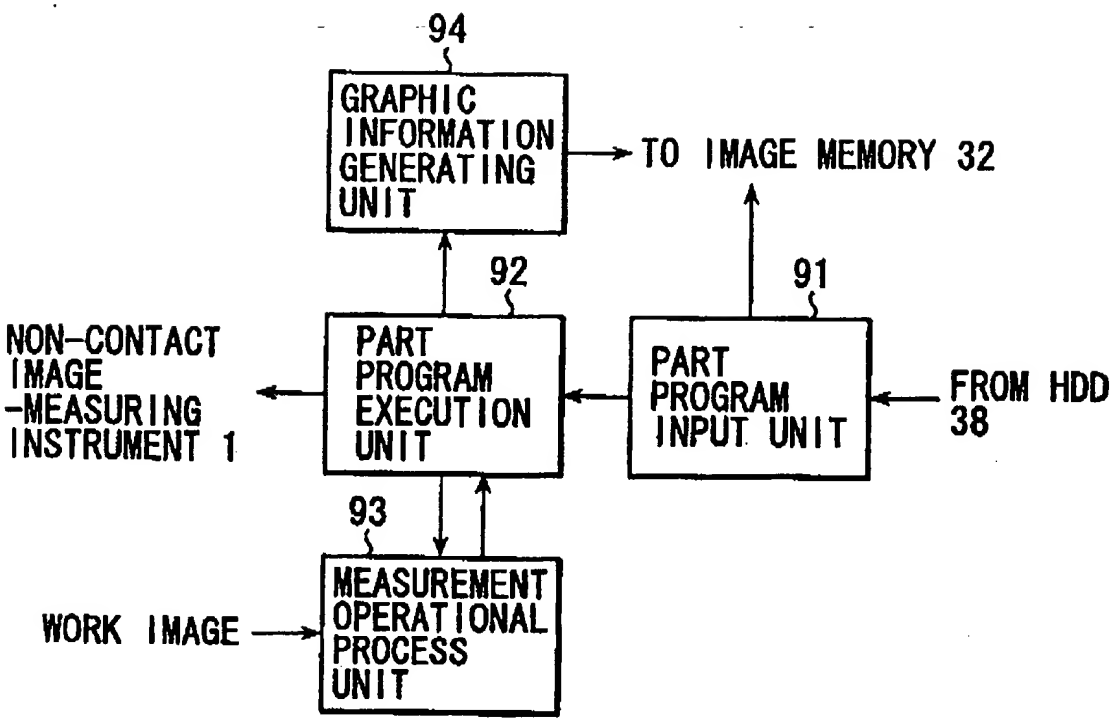

94
GRAPHIC INFORMATION GENERATING UNIT
TO IMAGE MEMORY 32
92
91
NON-CONTACT IMAGE -MEASURING INSTRUMENT 1
PART PROGRAM EXECUTION UNIT
PART PROGRAM INPUT UNIT
FROM HDD 38
93
WORK IMAGE
MEASUREMENT OPERATIONAL PROCESS UNIT

FIG. 15

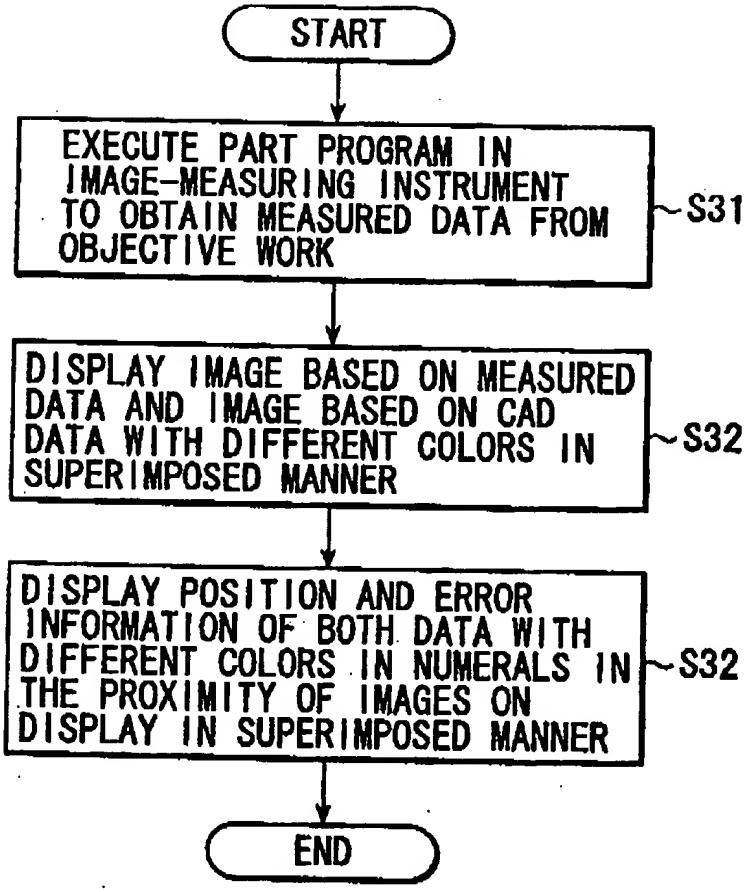

START
EXECUTE PART PROGRAM IN IMAGE-MEASURING INSTRUMENT TO OBTAIN MEASURED DATA FROM OBJECTIVE WORK
S31
DISPLAY IMAGE BASED ON MEASURED DATA AND IMAGE BASED ON CAD DATA WITH DIFFERENT COLORS IN SUPERIMPOSED MANNER
S32
DISPLAY POSITION AND ERROR INFORMATION OF BOTH DATA WITH DIFFERENT COLORS IN NUMERALS IN THE PROXIMITY OF IMAGES ON DISPLAY IN SUPERIMPOSED MANNER
S32
END

FIG. 16

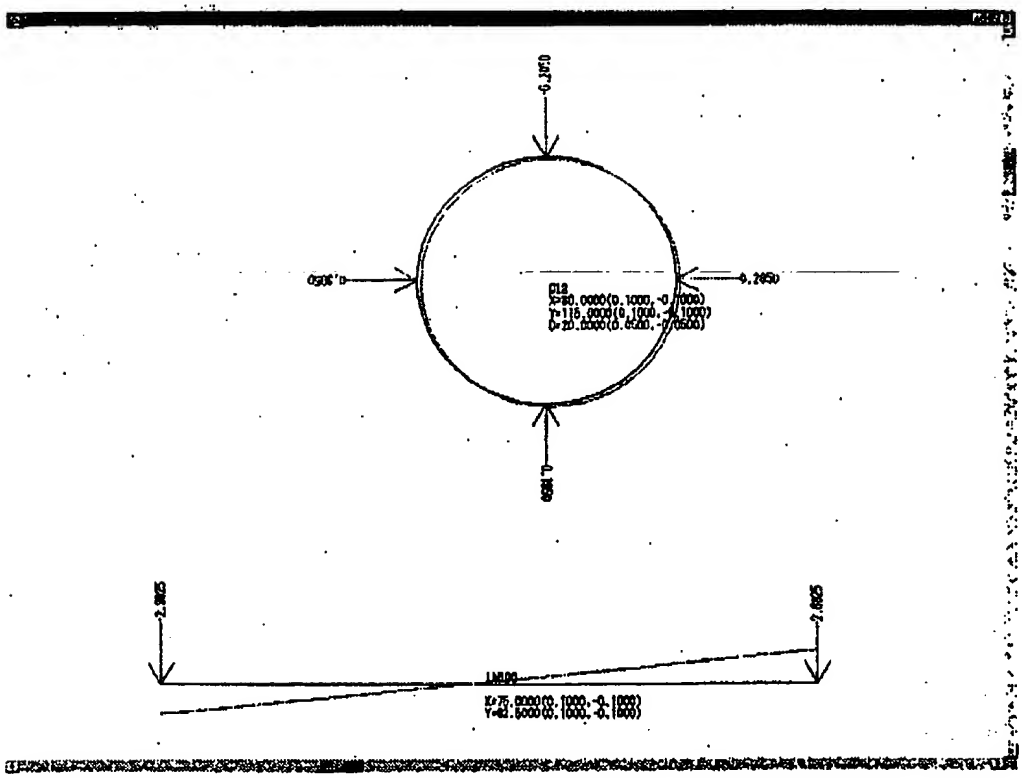
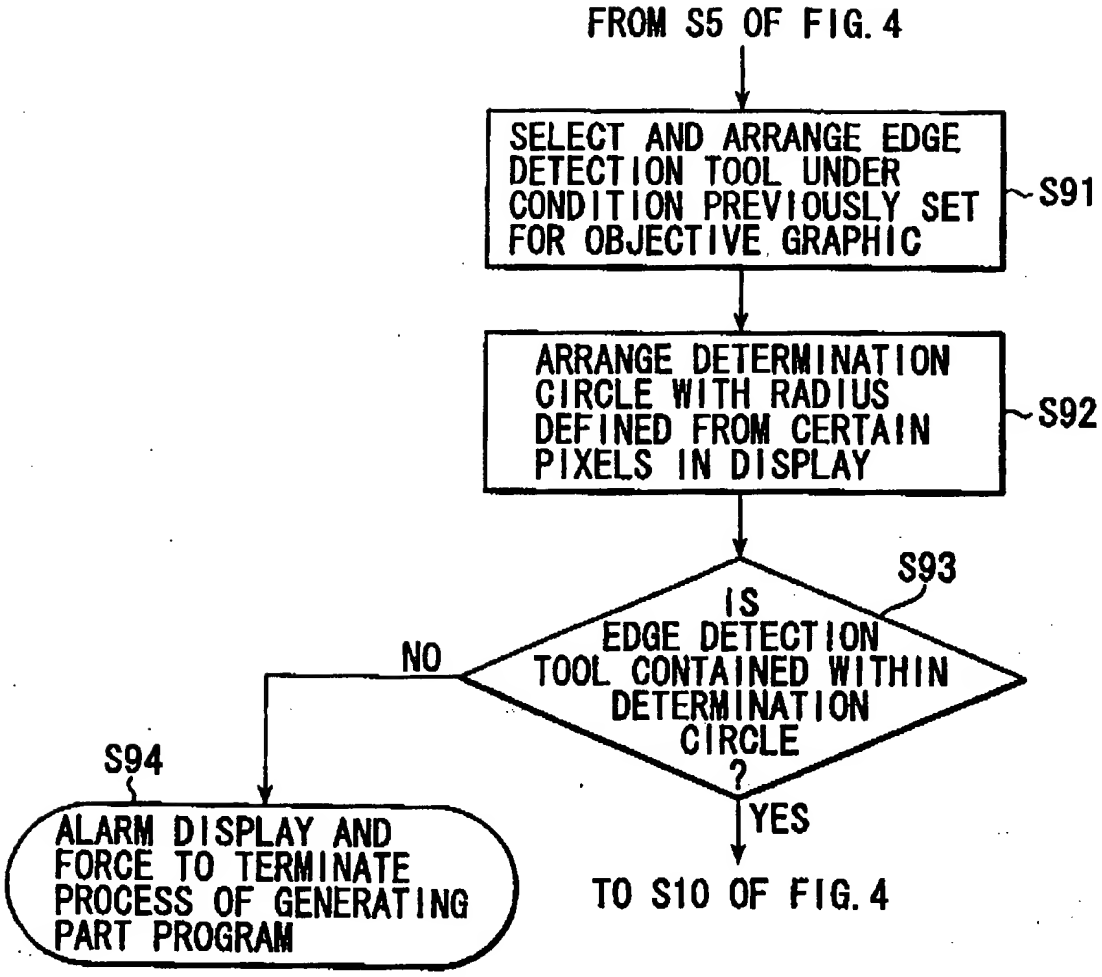


FIG. 17


FROM S5 OF FIG. 4
SELECT AND ARRANGE EDGE DETECTION TOOL UNDER CONDITION PREVIOUSLY SET FOR OBJECTIVE GRAPHIC
S91
ARRANGE DETERMINATION CIRCLE WITH RADIUS DEFINED FROM CERTAIN PIXELS IN DISPLAY
S92
S93
IS EDGE DETECTION TOOL CONTAINED WITHIN DETERMINATION CIRCLE ?
NO
YES
S94
ALARM DISPLAY AND FORCE TO TERMINATE PROCESS OF GENERATING PART PROGRAM
TO S10 OF FIG. 4